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United States. Office of Hydropower Scoping document 1 for Missouri-Madison Hydroelectric

SCOPING DOCUMENT I FOR MISSOURI-MADISON HYDROELECTRIC PROJECT (FERC Project No. 2188)

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December 1993

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Federal Energy Regulatory Commission
Office of Hydropower Licensing
Washington, D.C.

December 1993

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426

To the Agency/Individual Addressed:

The Federal Energy Regulatory Commission (FERC) has received an application for a new license (relicense) for the Missouri-Madison Hydroelectric Project No. 2188. The project, which is located on the Missouri and Madison Rivers, consists of nine developments located between West Yellowstone and Great Falls, Montana.

The FERC staff has decided that relicensing this project is a major federal action significantly affecting the quality of the human environment. Therefore, staff intends to prepare an Environmental Impact Statement (EIS) on the projects in accordance with the National Environmental Policy Act.

Enclosed is a preliminary scoping document that outlines the environmental issues that FERC staff has initially identified to address in the EIS. We are interested in your thoughts on these issues and any other issues you feel we need to address.

Please review this document and if you have comments or wish to participate in the scoping process, attend one or more of the scoping meetings identified in Section 1.1. If you cannot attend, please follow the instructions in Section 1.1 on how to mail your written comments to the FERC.

If you have any questions, please call me at (202) 219-3056.

Sincerely,

John McEachern
Task Monitor

Enclosure

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SECTION 1.0
INTRODUCTION

Pending before the Federal Energy Regulatory Commission (Commission) is an application for a new license (i.e., relicense) filed by the Montana Power Company for the Missouri-Madison Hydroelectric Project (FERC Project No. 2188). The project, which is located on the Missouri and Madison Rivers, consists of nine developments located between West Yellowstone and Great Falls, Montana (Fig. 1). The project is primarily operated for power production purposes with consideration for flood control, fish and wildlife, and recreation.

On reviewing the application, supplemental filings and intervenor submittals, the Commission staff has concluded that issuing a new license for the Missouri-Madison Project would constitute a major federal action that could significantly affect the quality of the human environment. Pursuant to the National Environmental Policy Act (NEPA) of 1969 and the Commission's regulations, the staff is preparing an environmental impact statement (EIS) that will describe and evaluate the probable impacts of Montana Power's proposal and alternatives.

A draft EIS (DEIS) is expected to be issued in the fall of 1995 and circulated to all interested parties for review. The Commission staff will analyze and consider all comments filed on the DEIS in a final EIS (FEIS). The staff's recommendations will then be presented to the Commission to consider in reaching its final licensing decision.

One element of the EIS process is scoping. Scoping activities are initiated early to:

- Identify reasonable alternative measures that should be evaluated in the EIS
- Identify significant environmental issues related to the proposed project
- Determine the depth of analysis for issues addressed in the EIS
- Identify resource issues that are not important and that do not require detailed analysis

This scoping document has been prepared to enable federal, state, and local resource agencies; other interested parties; and the general public to effectively participate in and contribute to the scoping process. This document contains the following:

- A discussion of the proposed site visit, scoping meetings, and information requested during scoping
- A schedule for EIS preparation
- A preliminary description of the proposed action and alternatives discussed and evaluated
- A preliminary list of environmental issues
- A preliminary outline of the EIS
- A list of the scoping document recipients

Figure 1. Upper Missouri River Basin showing the location of the facilities that comprise the Missouri-Madison Hydroelectric Project (FERC Project No. 2188) (Source: The staff)

1.1 SITE VISIT AND SCOPING MEETINGS

From November 16 through 18, 1993, Commission staff participated in site visits to the following sites:

- Great Falls developments (Black Eagle, Rainbow, Cochrane, Ryan, and Morony),
- Holter and Hauser developments, and
- Madison and Hebgen developments.

All interested individuals, organizations, and agencies were invited to attend the site visits and are also invited to assist the staff in identifying the scope of environmental issues that should be analyzed in the EIS. Each site visit was conducted in the company of Montana Power Company representatives; federal, state, and local resource agencies and government officials; interested parties; organizations; and interested individuals.

Commission staff will conduct four scoping meetings. Three evening scoping meetings will be primarily for public input, while a day-time meeting will focus on resource agency and non-governmental organization (NGO) concerns. All interested individuals, organizations, and agencies are invited to attend one or more of the meetings to assist the staff in identifying the scope of environmental issues that should be analyzed in the EIS. The times and locations of the evening scoping meetings are as follows:

Tuesday, January 18, 1994: 7:00 p.m. in the Missouri Room of the Great Falls Civic Center, Great Falls, Montana.

Wednesday, January 19, 1994: 7:00 p.m. in the Judicial Room of the Best Western Colonial Inn, Helena, Montana.

Thursday, January 20, 1994: 7:00 p.m. in the Ennis High School Library, Ennis, Montana.

The staff will also hold a scoping meeting oriented toward resource agencies and NGOs on Wednesday, January 19, 1994, from 1:00 to 3:00 p.m. in the Judicial Room of the Best Western Colonial Inn, Helena, Montana.

Objectives

At the scoping meetings, the staff will:

(1) Summarize the environmental issues tentatively identified for analysis in the planned EIS

(2) Determine the depth of analysis for issues to be addressed in the EIS

(3) Identify resource issues that are not important and do not require detailed analysis

(4) Solicit all available information from the meeting participants, especially quantifiable data on the resources at issue

(5) Encourage statements from experts and the public on issues that should be analyzed in the EIS, including viewpoints that oppose or support the staff's preliminary views

Procedures

The scoping meetings will be recorded by a stenographer and the notes will become part of the formal record of the Commission proceedings on the Missouri-Madison Hydroelectric Project. Before the meeting starts, individuals who intend to make statements during the meeting will be asked to sign in to clearly identify themselves for the record.

Concerned parties are encouraged to offer us verbal guidance during public meetings. Speaking time allowed for individuals will be determined before each meeting, based on the number of persons wishing to speak and the approximate amount of time available for the session, but all speakers will be provided at least five minutes to present their views.

People choosing not to speak but wishing to express an opinion, as well as speakers unable to summarize their positions within their allotted time, may submit written statements at the meetings for inclusion in the public record.

Written scoping comments may also be filed with the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street NE, Washington, D.C. 20426, until February 21, 1994. All filings should contain an original and 8 copies. Failure to file an original and 8 copies may result in appropriate staff not receiving the benefit of your comments in a timely manner. See 18 C.F.R. 4.34(h).

All correspondence should clearly show the following caption on the first page:

Missouri-Madison Hydroelectric Project
FERC Project No. 2188, Montana.

All those attending site visits and scoping meetings are urged to refrain from making any communication concerning the merits of the application to any member of the Commission staff or the Commission's contractor outside of the established process for developing the record as stated above. Any such communications will be entered by staff into the record of the proceeding.

Further, interested persons are reminded of the Commission's Rules of Practice and Procedure, requiring parties or interceders (as defined in 18 C.F.R. 385.2010) filing documents with the Commission to serve a copy of the document on each person whose name is on the official service list for this proceeding. See 18 C.F.R. 4.34(b).

1.2 INFORMATION REQUESTED

Federal, state, and local resource agencies and other interested groups or individuals are requested to forward to the Commission, or present at the scoping meetings, any information they believe will assist the Commission staff in conducting an accurate and thorough analysis of environmental impacts associated with the licensing of the Missouri-Madison Project. The types of information sought include the following:

- Existing information, data, reports or resource plans that would aid in characterizing baseline physical, biological, and social environments in the project's vicinity

- Information, data, or professional judgement that may help identify or evaluate significant environmental issues, and other environmental issues that are determined not significant.

To be useful in preparing the EIS, the Commission must receive input no later than February 21, 1994. In addition, any information that can be submitted before the scoping meetings would be greatly appreciated. Written comments may be filed with the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street NE, Washington, DC 20426.

All filings should contain an original and 8 copies. Failure to file an original and 8 copies may result in appropriate staff not receiving the benefit of your information in a timely manner. See 18 C.F.R. 4.34(h).

All correspondence should clearly show the following caption on the first page:

Missouri-Madison Hydroelectric Project
FERC Project No. 2188, Montana.

Interested persons are reminded of the Commission's Rules of Practice and Procedure, requiring parties or interceders (as defined in 18 C.F.R. 385.2010) filing documents with the Commission to serve a copy of the document on each person whose name is on the official service list for this proceeding. See 18 C.F.R. 4.34(b).

1.3 EIS PREPARATION SCHEDULE

The proposed schedule for EIS preparation calls for releasing the DEIS in the spring of 1995, and the FEIS in the fall of 1995. However, this schedule is preliminary and subject to change based on the results of the scoping process, the need for additional studies, and agency and public reviews of the DEIS.

SECTION 2.0
BACKGROUND

The existing Missouri-Madison Hydroelectric Project consists of nine developments, eight of which operate as generating facilities and one that operates as a storage facility. The developments, which were built between 1891 and 1958, are located between river mile (RM) 103 of the Madison River and RM 2,105 of the Missouri River in southwestern Montana (Fig. 1). Beginning with the most upstream development, a description of each of the nine Missouri-Madison Project developments follows.

2.1 DESCRIPTION OF THE PROJECT

Hebgen Development

Hebgen Dam, which operates as a storage facility, was constructed in 1915 at RM 103 of the Madison River near West Yellowstone, in Gallatin County, Montana. The dam stores and regulates flow from a 905 square mile drainage area. Hebgen Reservoir has a surface area of 13,000 acres at normal maximum reservoir water level of 6,534.9 feet. Normal maximum reservoir storage is 386,184 acre-feet, of which 378,845 acre-feet are usable storage between elevations 6,473 feet and 6,543.87 feet. The Hebgen Development encompasses a total area of 12,673 acres, including 1,336 acres owned by Montana Power, 10,790 acres of federal lands (USFS), 528 acres on which Montana Power has flood rights, and 19 acres of other lands.

Existing structures at the Hebgen Development include a diversion dam, an outlet works, a side-channel spillway, several buildings, and two 15 kW diesel-fueled generators. The dam is an earth-filled structure 721 feet long and 85 feet above the streambed. The outlet works consists of an intake structure, an outlet conduit through the dam, and a terminal structure. The spillway, which is located on the right bank of the river, is 375 feet long and discharges to a discharge chute that varies from 47 feet wide at the inlet to 20 feet wide at the downstream end. The downstream end is equipped with a flip bucket that provides energy dissipation into a riprap-lined plunge pool in the Madison River. The buildings include a residence, garage, recreation residences, and boathouse.

Madison Development

Madison Dam, which has an existing generating capacity of 8.6 MW, was constructed in 1906 at RM 40 of the Madison River in Madison County, Montana. The Madison Development reservoir, known as Ennis Lake, intercepts a drainage area of 2,181 square miles and has a normal maximum surface area of 3,900 acres at elevation 4,841 feet. Normal maximum reservoir storage is 41,917 acre-feet, of which 39,115 acre-feet are usable storage between elevations 4,826 feet and 4,841 feet. The Madison Development encompasses a total area of 4,176 acres, including 3,816 acres owned by Montana Power, 358 acres of federal lands (BLM), and two acres of other lands.

Existing structures at the Madison Development consist of the diversion dam, intake, a flow line, a surge chamber, penstocks, a powerhouse, and a tailrace. The generating facilities at the powerhouse connect to a 100-kV power line that is part of Montana Power's transmission system. The dam, which is 257 feet long and 38.5 feet high above the streambed, consists of a rock-filled spillway, a concrete intake structure, and two non-overflow abutment sections at each end. The spillway is 140 feet long with roller-equipped side panels for providing control of flow. The intake is at the right

end of the spillway and provides flow control to the steel flow line. The flow line, which is 7,500 feet long and 13 feet in diameter, is located on the right side of the river and leads to the surge chamber and the powerhouse. The concrete surge chamber is 38 feet wide, 117 feet long, and 34 feet high, and has an overflow spillway over which water is discharged in the event of a plant trip. Four penstocks 9 feet in diameter and about 90 feet long convey water from the surge chamber to the powerhouse. The powerhouse is 203 feet long, 67 feet wide, and 36 feet high, and contains four generating units and associated equipment. No power line separate from Montana Power's integrated system is associated with the Madison Development.

Hauser Development

Hauser Dam, which has an existing generating capacity of 16.5 MW, was constructed in 1911 at RM 2,237 of the Missouri River in Lewis and Clark County, about 14 miles northeast of Helena, Montana. The development consists of two connected reservoirs, Hauser Lake and Lake Helena, which have a surface area of 5,970 acres and intercept a drainage area of 16,876 square miles. Usable storage capacities are 52,893 acre-feet for Hauser Lake and 11,360 acre-feet for Lake Helena. The Hauser Development encompasses a total area of 5,418 acres, including 4,097 acres owned by Montana Power, 649 acres of federal lands (USFS and BLM), 670 acres on which Montana Power has flood rights, and two acres of other lands.

Existing structures at the Hauser Development consist of a diversion dam, a forebay, six penstocks, a powerhouse, a tailrace, and two 69-kV transmission lines. A roadway embankment with a sluiceway connection to the main reservoir isolates Lake Helena from Hauser Lake. Hauser Dam is 700 feet long and 80 feet high above the streambed. It consists of a spillway, a non-overflow section, a forebay intake section, and two abutment sections. The spillway is 493 feet long with slidegates and removable flashboards for flow control. The intake, which enters the forebay, is located between the non-overflow section and the right abutment section. The forebay is a concrete structure 250 feet long and 39 feet wide, which directs flow to the powerhouse. Six steel penstocks 12 to 14 feet in diameter convey water from the forebay to the six turbines in the powerhouse, which is 236 feet long and 57 feet wide. Each of the two transmission lines is 12 miles long and extends to the East Helena switching station.

Holter Development

Holter Dam, which has an existing generating capacity of 50 MW, was constructed in 1918 at RM 2,211 of the Missouri River in Lewis and Clark County, about 43 miles northeast of Helena, Montana. Holter Lake has a surface area of 4,550 acres at an elevation of 3,564 feet and intercepts an area of 17,150 square miles. Normal maximum reservoir storage is 240,000 acre-feet, of which 81,920 acre-feet are usable storage between elevations 3,543 feet and 3,564 feet. The Holter Development encompasses an area of 4,019 acres, including 2,988 acres owned by Montana Power, 733 acres of federal lands (USFS and BLM), and 298 acres on which Montana Power has flood rights.

Existing structures at the Holter Development consist of a diversion dam, a powerhouse, and a tailrace. The dam is 1,364 feet long and 124 feet high above the streambed. It consists of a central overflow spillway section, right and left non-overflow sections, and a powerhouse intake section. The spillway is 682 feet long with slide gates and removable flashboards for flow control. The powerhouse

is constructed integrally with the dam and averages 208 feet long and 81 feet wide. No power line separate from Montana Power's integrated system is associated with the Holter Development.

Black Eagle Development

Black Eagle Dam, which has an existing generating capacity of 18 MW, was constructed in 1891 at RM 2,118 of the Missouri River in Cascade County, northeast of Great Falls, Montana. Black Eagle Reservoir intercepts an area of 22,100 square miles and has a surface area of 402 acres at the normal maximum reservoir water level of 3,290 feet elevation. Normal maximum reservoir storage is 1,820 acre-feet, of which 1,710 acre-feet are usable storage between elevations 3,279 feet and 3,290 feet. The Black Eagle Development encompasses a total of 439 acres, including 8 acres owned by Montana Power, 64 acres on which Montana Power has flood rights, 3 acres of other lands, and 364 acres of land not described by a General Land Office survey. No federal lands are within the development.

Existing structures at the Black Eagle Development consist of a diversion dam, a forebay, a powerhouse, and a tailrace. The dam is 782 feet long and 34.5 feet high above the streambed. It consists of a 646-foot-long overflow spillway with removable flashboards for flow control, a 105-foot-long wastegate section with slidegates for flow control, and a right abutment section. The forebay, which forms the left abutment of the dam, is 421 feet long and 96 feet wide and directs flow to the powerhouse. The intake and the powerhouse are constructed integrally with the dam. The powerhouse averages 135 feet long and 50 feet wide and contains three generators. The tailrace channel is about 1,500 feet long with concrete sidewalls. No power line separate from Montana Power's integrated system is associated with the Black Eagle Development.

Rainbow Development

Rainbow Dam, which has an existing generating capacity of 35 MW, was constructed in 1910 at RM 2,115 of the Missouri River, 3 miles downstream from Black Eagle Dam. Rainbow Reservoir has a surface area of 126 acres at normal reservoir water level of 3,224 feet. Normal maximum reservoir storage is 1,237 acre-feet, of which 1,170 acre-feet are usable storage between elevations 3,212 feet and 3,224 feet. The Rainbow Development encompasses a total area of 360 acres, including 101 acres owned by Montana Power, 0.6 acre on which Montana Power has flood rights, and 258 acres not described by a General Land Office survey. No federal lands are within the project.

Existing structures at the Rainbow Development include a diversion dam, three flow lines, a surge tank, a surge chamber, 16 penstocks, a powerhouse, and a tailrace. The dam, which is 1,146 feet long and 44 feet high above the streambed, consists of an overflow spillway, a concrete intake section, and a wastegate structure on the right abutment. The spillway is 1,065 feet long with rubber dams and removable flashboards for flow control. Two adjacent structures totaling about 200 feet wide form the intake, which discharges into flow lines that are about 2,400 feet long. Flow lines for units 7 and 8 have a surge tank 176 feet in diameter and 48 feet high. A standpipe 12 feet in diameter and 45 feet high is upstream of the surge tank. Flow lines for units 1 through 6 lead to the surge chamber, which is 182 feet wide and 346 feet long and has a spillway for discharge of water in the event of a plant trip. Sixteen buried penstocks transfer water from the surge tank and surge chamber to the eight turbine generating units in the powerhouse. The powerhouse is 41 feet wide and 415 feet long with smaller extensions. The tailrace below the powerhouse is about 60 feet wide and 850 feet long. No power line separate from Montana Power's integrated system is associated with the Rainbow Development.

Cochrane Development

Cochrane Dam, which has an existing generating capacity of 54.7 MW, was constructed in 1958 at RM 2,111 of the Missouri River in Cascade County, northeast of Great Falls, Montana. It is 4 miles downstream from Rainbow Dam. Cochrane Reservoir intercepts an area of 23,270 square miles and has a surface area of 249 acres at the normal maximum reservoir water level of 3,115 feet elevation. Normal maximum reservoir storage is 8,464 acre-feet, of which 4,503 acre-feet are usable storage between elevations 3,090 feet and 3,115 feet. The Cochrane Development encompasses a total area of 247 acres, including 13.4 acres owned by Montana Power, 0.3 acres on which Montana Power has flood rights, and 233 acres not described by a General Land Office survey. No federal lands are in the development area.

Existing structures at the Cochrane Development consist of a diversion dam, a powerhouse, a tailrace, and a 100-kV transmission line. The diversion dam is 856 feet long and 100 feet high above the streambed. It has a spillway section, a powerhouse/intake section, and left and right non-overflow sections. The spillway has radial gates for flow control and a standby generator for emergency gate operation. The intake, penstocks, and powerhouse are constructed integrally with the dam. The left and right non-overflow sections are 190 and 144 feet long, respectively. The transmission line is 2.9 miles long and connects the Cochrane Development to the Rainbow Development switchyard.

Ryan Development

Ryan Dam, which has an existing generating capacity of 60 MW, was constructed in 1915 at RM 2,110 of the Missouri River in Cascade County, 8 miles downstream of Great Falls, Montana. The dam is 1 mile downstream from Cochrane Dam. Ryan Reservoir intercepts a drainage area of 23,080 square miles and has a surface area of 168 acres at normal maximum elevation of 3,037 feet. Normal maximum reservoir storage is 3,653 acre-feet, of which 2,440 acre-feet are usable storage between elevations 3,020 feet and 3,037 feet. The Ryan Development encompasses a total area of 408 acres, including 147 acres owned by Montana Power and 261 acres not described by a General Land Office survey. No federal lands are within the development.

Existing structures at the Ryan Development consist of a diversion dam, penstocks, a powerhouse, a tailrace, and two adjacent 100-kV transmission lines. The diversion dam is 1,465 feet long and 82 feet high above the streambed. It consists of an overflow spillway, a wastegate section, an intake section, and left and right abutment sections. The spillway is 1,000 feet long with removable flashboards for flow control. The wastegate is 129 feet long with gates for flow control and a skimmer gate. The intake section is between the wastegate section and the left abutment and is 135 feet long. The left and right abutments are 150 and 100 feet long, respectively. Eight buried 327-foot-long penstocks convey water from the intake to the powerhouse, which is 253 feet long and 89 feet wide with six main generators and two exciters. The tailrace is about 1,500 feet long and tapers from 220 feet wide at its upstream end to 100 feet wide at the discharge. The two adjacent power lines are 4.6 miles long and terminate at the Rainbow Development switching station.

Morony Development

Morony Dam, which has an existing generating capacity of 49 MW, was constructed in 1930 at RM 2,105 of the Missouri River in Cascade County, about 12 miles northeast of Great Falls, Montana. It is 5 miles downstream from Ryan Dam. Morony Reservoir intercepts a total drainage area of

23,292 square miles and has a surface area of 304 acres at normal maximum reservoir water level of 2,887 feet elevation. Normal maximum reservoir storage is 13,598 acre-feet, of which 7,595 acre-feet are usable storage between elevations 2,887 feet and 2,861 feet. The Morony Development encompasses a total area of 439 acres, including 96 acres owned by Montana Power, 7 acres on which Montana Power has flood rights, 7 acres of other lands, and 329 acres of land not described by a General Land Office survey. No federal lands are within the development.

Existing structures at the Morony Development consist of a diversion dam, a powerhouse integral with the dam, a tailrace, and a 100-kV transmission line. The dam is 842 feet long and 96 feet high above the streambed. It consists of an overflow spillway section, a powerhouse/intake section, and left and right non-overflow sections. The spillway is 390 feet long with nine radial gates for regulating flow and a slide gate for handling trash. The powerhouse/intake section is 195 feet long and contains the penstocks leading to the powerhouse, which is 162 feet long and 58 feet wide. Water is discharged through a short tail race. The left and right non-overflow sections of the dam are 199 and 68 feet long, respectively. The 100-kV transmission line is 8.5 miles long and terminates at the Great Falls switchyard. The original license included a 7.4-mile-long, 100-kV transmission line to the Rainbow Development switchyard.

2.2 OPERATION OF THE PROJECT

Hebgen Development

The Hebgen Development is operated as a storage facility with releases made to provide head and flow to the eight Montana Power hydroelectric facilities and the Canyon Ferry Hydroelectric Project downstream. Under existing operations, Montana Power drafts Hebgen Reservoir 11 feet from September through November and maintains the reservoir at 6,524 feet through May.

The Missouri River Coordination Agreement (a contract between Montana Power and BUREC) requires that water stored in Hebgen Reservoir be used to enhance downstream power production if extreme drought conditions persist for an extended period. Drafting Hebgen Reservoir for this purpose is only required after all storage in Canyon Ferry Reservoir above elevation 3,769 ft. (28 ft. below Canyon Ferry's normal full pool) has been utilized.

Madison Development

The Madison Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of the Madison Reservoir (Ennis Lake) between 4,839 ft. and 4,841 ft. (normal full pool). Montana Power maintains the reservoir level at a 2-foot drawdown (4,839 feet) for the entire winter season.

The estimated annual plant factor of the existing Madison Development is 82.9%, as defined by the ratio of average annual generation (7.13 MW) to power plant capacity (8.6 MW). The hydraulic capacity of the existing turbines at Madison is 1,650 cfs.

The Missouri River Coordination Agreement requires that water stored in the Madison Reservoir be used to enhance downstream power production if extreme drought conditions persist for an extended period. The maximum required draft for this purpose is to elevation 4,831.5 ft. Drafting the Madison Reservoir for this purpose is only required after all of the storage in Canyon Ferry Reservoir and Hebgen Reservoir has been utilized.

Hauser Development

The Hauser Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir levels are maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Hauser Reservoir and Lake Helena between 3,634.4 ft. and 3,635.4 ft. (normal full pool). Montana Power does not draft Hauser Reservoir and Lake Helena during the winter season because of significant losses in power generation and potential impacts to fisheries and bald eagles.

The estimated annual plant factor of the existing Hauser Development is 85.4%, as defined by the ratio of average annual generation (14.1 MW) to power plant capacity (16.5 MW). The hydraulic capacity of the existing turbines at Hauser is 4,740 cfs. Peaking operations are technically possible with the capacity and storage of the Hauser Development, but regularly scheduled peaking would adversely impact the fishery downstream.

The Missouri River Coordination Agreement requires that water stored in Hauser Reservoir and Lake Helena be used to enhance downstream power production if extreme drought conditions persist for an extended period. The maximum required draft for this purpose is to elevation 3,621 ft. Drafting Hauser Reservoir and Lake Helena for this purpose is only required after all of the storage in Canyon Ferry Reservoir and Hebgen Reservoir has been utilized.

Holter Development

The Holter Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Holter Reservoir between 3,563 ft. and 3,564 ft. (normal full pool). Montana Power does not draft Holter Reservoir during the winter season because of significant losses in power generation and potential impacts to fisheries.

The estimated annual plant factor of the existing Holter Development is 66.8%, as defined by the ratio of average annual generation (33.4 MW) to power plant capacity (50 MW). The hydraulic capacity of the existing turbines at Holter is 7,100 cfs, and this capacity uses the full flow of the Missouri River approximately 87% of the time. Peaking or load-shaping operation is technically possible with the capacity and storage of the Holter Development, but regularly scheduled peaking would adversely impact the fishery between Holter Dam and Great Falls, Montana.

The Missouri River Coordination Agreement requires that water stored in Holter Reservoir be used to enhance downstream power production if extreme drought conditions persist for an extended period. The maximum required draft for this purpose is to elevation 3,548 ft. Drafting Holter

Reservoir for this purpose is only required after all of the storage in Canyon Ferry Reservoir and Hebgen Reservoir has been utilized.

Black Eagle Development

The Black Eagle Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Black Eagle Reservoir near its normal full pool elevation of 3,290 ft. Montana Power does not draft Black Eagle Reservoir during the winter season because of significant losses in power generation.

The estimated annual plant factor of the existing Black Eagle Development is 86.9%, as defined by the ratio of average annual generation (15.64 MW) to power plant capacity (18 MW). The hydraulic capacity of the existing turbines at Black Eagle is 5,040 cfs. Peaking operations are impractical because of the relatively small usable storage volume of Black Eagle Reservoir.

Rainbow Development

The Rainbow Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Rainbow Reservoir near its normal full pool elevation of 3,224 ft. Montana Power does not draft Rainbow Reservoir during the winter season because of significant losses in power generation.

The estimated annual plant factor of the existing Rainbow Development is 84%, as defined by the ratio of average annual generation (29.4 MW) to power plant capacity (35 MW). The hydraulic capacity of the existing turbines at Rainbow is 5,400 cfs. Peaking operations are impractical because of the relatively small usable storage volume of Rainbow Reservoir.

Cochrane Development

The Cochrane Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Cochrane Reservoir near its normal full pool elevation of 3,115 ft. Montana Power does not draft Cochrane Reservoir during the winter season because of significant losses in power generation.

The estimated annual plant factor of the existing Cochrane Development is 61.7%, as defined by the ratio of average annual generation (33.7 MW) to power plant capacity (54.7 MW). The hydraulic capacity of the existing turbines at Cochrane is 10,800 cfs, and this capacity uses the full flow of the Missouri River approximately 90% of the time. Currently, peaking operations are technically possible

with the capacity and storage of Cochrane Reservoir, but reservoir levels associated with regularly scheduled peaking would flood the existing Rainbow powerhouse immediately upstream.

Ryan Development

The Ryan Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Ryan Reservoir near its normal full pool elevation of 3,037 ft. Montana Power does not draft Ryan Reservoir during the winter season because of significant losses in power generation.

The estimated annual plant factor of the existing Ryan Development is 84.5%, as defined by the ratio of average annual generation (50.7 MW) to power plant capacity (60 MW). The hydraulic capacity of the existing turbines at Ryan is 5,900 cfs.

Morony Development

The Morony Development is operated as a baseload, run-of-river facility for the production of electrical power. Under existing operations, the plant uses inflows as they occur and the reservoir level is maintained relatively constant by spilling water during high flows and curtailing generation during low flows. Morony Reservoir has also been used to re-regulate short-term flow fluctuations from the Cochrane and Ryan developments to reduce downstream flow fluctuations. To the extent possible, given the variability of inflows, Montana Power maintains the elevation of Morony Reservoir near its normal full pool elevation of 2,887 ft. Montana Power does not draft Morony Reservoir during the winter season because of significant losses in power generation.

The estimated annual plant factor of the existing Morony Development is 69%, as defined by the ratio of average annual generation (33.8 MW) to power plant capacity (49 MW). The hydraulic capacity of the existing turbines at Morony is 8,280 cfs, and this capacity uses the full flow of the Missouri River approximately 78% of the time.

2.3 PROCEDURAL HISTORY

Montana Power applied for the original license for the Missouri-Madison Hydroelectric Project on June 14, 1955, and was granted a license on April 23, 1956. On November 25, 1992, Montana Power filed with the Commission an application for a new license for the Missouri-Madison Project. On December 14, 1992, Commission staff issued a Tendered Notice of the application filing, asking that interested parties submit requests for additional studies by January 25, 1993. Such requests were submitted by: the Montana Department of Natural Resources and Conservation; the Montana Department of Fish, Wildlife and Parks; the U.S. Environmental Protection Agency; the U.S. Fish and Wildlife Service; the Bureau of Land Management; Trout Unlimited; and a group of local conservationists.

In September, 1993, Commission staff determined that an EIS should be prepared because issuing a new license for the Missouri-Madison Project would constitute a major federal action that could significantly affect the quality of the human environment. In the EIS, staff will address the

environmental effects of relicensing the Missouri-Madison Project, including potential cumulative effects of the project with other developments.

On November 16, 1993, Commission staff conducted an interagency coordination meeting on the Missouri-Madison Project EIS in Helena, Montana. Also on November 16, staff participated in site visits at the Great Falls developments (Black Eagle, Rainbow, Cochrane, Ryan, and Morony). Commission staff participated in site visits to the Holter and Hauser developments on November 17, 1993. On November 18, 1993, Commission staff participated in site visits to the Madison and Hebgen developments.

SECTION 3.0
PROPOSED ACTION AND PRINCIPAL ALTERNATIVES

This section contains a description of Montana Power's proposals for project modifications, operations, and enhancement measures, and identifies potential alternative operating regimes and enhancements that have been suggested by agencies and intervenors. A description of the no-action alternative is also provided. Information about existing operations (the no-action alternative), Montana Power's proposed operations, and alternative operating regimes is summarized in Table 3.1.

3.1 MONTANA POWER'S PROPOSAL

Montana Power has proposed site-specific changes to project facilities and operations at some Missouri-Madison Project developments. These changes are discussed for each development in the following sections. Montana Power has also proposed numerous mitigation and enhancement measures; some are applicable to the entire project or groups of developments and others are for individual developments. The following text describes Montana Power's mitigation and enhancement proposals for the entire project and groups of developments, while proposals for individual developments are discussed in the following sections.

Montana Power proposes to establish five separate technical committees to oversee and direct adaptive management of the project over the term of the license; to implement proposed research, mitigation, and enhancement measures; and to manage certain funding provided by Montana Power and agencies. For certain mitigation and enhancement activities, Montana Power would provide funding to the committees for management, whereas other activities would be funded by Montana Power in consultation with the agencies represented on the committees. If monitoring or research studies document significant impacts to fisheries, wildlife, or water quality, Montana Power and the relevant technical committees would determine the cost of reasonable mitigation for specific resource losses, and Montana Power would, within one year, contribute funding to cover the cost of the mitigation. The committees would meet at least semiannually and, every two years, would prepare a report describing committee activities, water quality, fisheries, wildlife, and habitat resources. The five proposed committees, their responsibilities, and their membership would be as follows:

1. Missouri-Madison River Wildlife: manage wildlife from Hebgen Reservoir to Fort Benton, Montana, which is located approximately 32 miles downstream of the Morony Development. Members: Montana Power Company (MPC), Montana Department of Fish, Wildlife, and Parks (MDFWP), U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and USFS.

2. Madison River Fisheries: manage fisheries from Hebgen Reservoir to the Three Forks of the Missouri River. Members: MPC, MDFWP, USFWS, and USFS.

3. Hauser-Holter Fisheries: manage fisheries from below Canyon Ferry Dam to Holter Dam. Members: MPC, MDFWP, USFWS, and USFS.

4. Missouri River Fisheries: manage fisheries from below Holter Dam to Fort Benton, Montana. Members: MPC, MDFWP, USFWS, and BLM.

TABLE 3.1 ALTERNATIVE OPERATING REGIMES FOR THE MISSOURI-MADISON HYDROELECTRIC PROJECT (FERC No. 2188) (Source: The staff)

Development/Feature	Existing Operations (No-Action Alternative)	Montana Power's Proposal	Other Alternatives Evaluated
Hebgen Development			
Reservoir drawdown	11 ft. September-November	11 ft. September-March	NA
Minimum flows	ROR	150 cfs	TBD[1]
Maximum flows	ROR	3,500 cfs	TBD
Ramping rates	NA	10% per day August-March	NA
Madison Development			
Reservoir drawdown	2 ft. winter	1 ft. winter (plus 1 ft. before ice break up)	NA
Minimum flows	ROR	1,100 cfs	TBD
Maximum flows	ROR	ROR	NA
Ramping rates	NA	NA	NA
Hauser Development			
Reservoir drawdown	NA	NA	1 ft. winter (plus 1 ft. before ice break up)
Minimum flows	ROR	ROR	TBD
Maximum flows	ROR	ROR	NA
Ramping rates	NA	10% of previous day's flow	NA

[1]To be determined during scoping.

TABLE 3.1 ALTERNATIVE OPERATING REGIMES FOR THE MISSOURI-MADISON HYDROELECTRIC PROJECT (FERC No. 2188) (Source: The staff) (continued)

Development/Feature	Existing Operations (No-Action Alternative)	Montana Power's Proposal	Other Alternatives Evaluated
Holter Development			
Reservoir drawdown	NA	NA	1 ft. winter (plus 1 ft. before ice break up)
Minimum flows	ROR	ROR	TBD[1]
Maximum flows	ROR	ROR	NA
Ramping rates	NA	10% of previous day's flow	NA
Black Eagle Development			
Reservoir drawdown	NA	NA	NA
Minimum flows	ROR	ROR[2]	TBD
Maximum flows	ROR	ROR	NA
Ramping rates	NA	NA	NA
Rainbow Development			
Reservoir drawdown	NA	NA	NA
Minimum flows	ROR	ROR[2]	TBD
Maximum Flows	ROR	ROR	NA
Ramping Rates	NA	NA	NA

[1]To be determined during scoping.

[2]Except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-ft (50% of the 1961-1990 average), Montana Power would spill a minimum of 200 cfs between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day (observed) weekend and ending with the Labor Day (observed) weekend.

TABLE 3.1 ALTERNATIVE OPERATING REGIMES FOR THE MISSOURI-MADISON HYDROELECTRIC PROJECT (FERC No. 2188) (Source: The staff) (continued)

Development/Feature	Existing Operations (No-Action Alternative)	Montana Power's Proposal	Other Alternatives Evaluated
Cochrane Development			
Reservoir drawdown	NA	10 ft. (peaking)	NA
Minimum flows	ROR	ROR	ROR (summer); Peaking (winter)
Maximum flows	ROR	ROR	ROR (summer); Peaking (winter)
Ramping rates	NA	NA	NA
Ryan Development			
Reservoir drawdown	NA	NA	NA
Minimum flows	ROR	ROR[2]	ROR (summer); Peaking (winter)
Maximum flows	ROR	ROR	ROR
Ramping rates	NA	NA	NA

[1]To be determined during scoping.

[2]Except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-ft (50% of the 1961-1990 average), Montana Power would spill a minimum of 200 cfs between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day (observed) weekend and ending with the Labor Day (observed) weekend.

TABLE 3.1 ALTERNATIVE OPERATING REGIMES FOR THE MISSOURI-MADISON HYDROELECTRIC PROJECT (FERC No. 2188) (Source: The staff) (continued)

Development/Feature	Existing Operations (No-Action Alternative)	Montana Power's Proposal	Other Alternatives Evaluated
Morony Development			
Reservoir drawdown	NA	NA	NA
Minimum flows	ROR	ROR	TBD[1]
Maximum flows	ROR	ROR	NA
Ramping rates	NA	15% of previous day's flow	NA

[1]To be determined during scoping.

5. Missouri-Madison River Water Quality: manage water quality from Hebgen Reservoir to Fort Benton, Montana. Members: MPC, Montana Department of Health and Environmental Services (MDHES), USFWS, USFS, and the Environmental Protection Agency (EPA).

For water quality, Montana Power proposes to monitor key water quality parameters in the Missouri-Madison River System from above Hebgen Reservoir to below Morony Dam. Monitoring would include total and dissolved nutrients (PO4-P, TKN, and NH3-N), total and dissolved metals (Ca, Mg, Fe, Al, and As), sediment (TSS, TDS, and turbidity), in situ variables (pH, conductivity, dissolved oxygen, and temperature), and chlorophyll. Montana Power also proposes to provide annual funding for water quality enhancement in the Missouri-Madison River System, including monitoring and treating of appropriate point source discharges, sediment control projects, applied water quality research studies, and monitoring of toxic algae.

Montana Power proposes to fund studies to determine the appropriate timing, magnitude, and duration of flushing flows (sediment transport) in the Missouri-Madison River System from Hebgen Reservoir to Morony Dam. Montana Power would also develop action plans and install dam structure upgrades necessary to restore Madison River flow within 30 minutes after a plant trip at the Madison Dam, Hauser Dam, Holter Dam, and Morony Dam.

For wildlife, Montana Power proposes one-time contributions for waterfowl habitat enhancement, a bald eagle study, and wildlife habitat protection and enhancement, and annual contributions for riparian habitat protection and enhancement in the Missouri-Madison River System from Hebgen Reservoir to Fort Benton, which is located approximately 32 miles downstream of the Morony Development. Montana Power would also support a wildlife biologist and a wildlife field technician to conduct monitoring, mitigation, and enhancement activities on the Missouri-Madison River System from Hebgen Reservoir to Fort Benton. Montana Power would provide annual funding for salaries and operation and maintenance expenses for the two positions, and one-time funding for equipment and materials.

For the Madison River from Hebgen Reservoir to Three Forks, Montana Power proposes to support a fisheries biologist and a fisheries field technician to conduct monitoring, mitigation, and enhancement activities. Montana Power would provide annual funding for salaries and operation and maintenance expenses for the two positions, and one-time funding for equipment and materials. Montana Power would also provide annual funding for fisheries habitat protection and enhancement.

For the Hauser and Holter developments, Montana Power proposes to support a fisheries biologist and a fisheries field technician to conduct monitoring, mitigation, and enhancement activities. Montana Power would provide annual funding for salaries and operation and maintenance expenses for the two positions, and one-time funding for equipment and materials. Montana Power would also provide annual funding to assist MDFWP in a fish stocking program and in developing measures to reduce fish losses from the reservoirs, and for fisheries habitat protection and enhancement.

For the Missouri River from Holter Dam to Fort Benton, Montana Power proposes to support a fisheries biologist and a fisheries field technician to conduct monitoring, mitigation, and enhancement activities. Montana Power would provide annual funding for salaries and operation and maintenance expenses for the two positions, and one-time funding for equipment and materials. Montana Power would also provide annual funding for fisheries habitat protection and enhancement.

For all actions that could affect historic, archaeological, or cultural resources, Montana Power would, in consultation with appropriate agencies, (1) determine the need for and extent of cultural resource inventory and assessment studies; (2) conduct on-site inventory and assessment studies; (3) identify potential adverse effects; and (4) develop and implement management plans. If impacts to historic properties are unavoidable, Montana Power would, in consultation with the National Park Service (NPS), undertake Historic American Building Survey documentation of the contributing element(s) that would be involved in the action.

For reservoir shoreline sites experiencing minor or moderate erosion, Montana Power proposes to visually inspect the sites on a 5- to 7-year basis. For shoreline sites with more significant erosion, Montana Power would conduct annual surveys and determine whether or not mitigation is appropriate. The license application identifies, for each development, sites where annual surveys would be conducted, including 18 sites at Hebgen Development, seven at Madison, six at Hauser, six at Holter, three at Black Eagle, three at Rainbow, six at Cochrane, one at Ryan, and four at Morony.

Montana Power proposes to develop a Comprehensive Recreation Management Plan for managing recreational resources along the Madison and Missouri rivers from Hebgen Reservoir to Fort Benton. The plan would be developed cooperatively with the MDFWP, BLM, USFS, and local agencies, and with input from private land owners and other interest groups. Regional working groups would be established for the Hebgen/Madison area, the Hauser/Holter area, and the Great Falls area. Montana Power has also developed a long-term funding strategy that has been incorporated into a memorandum of understanding between Montana Power and affected federal, state, and local agencies. The funding strategy would provide capital improvements (recreation site acquisition and development) within the first 5 years after issuance of a new license, and a portion of the fund would generate annual interest income for future recreation site acquisition, development, and operation.

Montana Power also proposes to conduct year-round recreation studies at each of the project developments in 1994, and seasonal studies every four years thereafter for the term of the license. Also, the applicant would, in consultation with appropriate agencies, develop a cooperative information and education plan.

For the Great Falls developments, Montana Power proposes mitigation and enhancement at a total cost of $2.9 million for one-time acquisition and/or development and $92,000 annually for operation and maintenance. The following project-wide and project-specific mitigation and enhancement is proposed:

(1) contribute to the establishment of a shuttle service for canoeists;
(2) contribute to the River's Edge Trail project for public access on the south side of the Great Falls developments;
(3) manage property on the north shoreline of the Great Falls developments as the North Shore Natural Area, contributing to development, operation, and maintenance costs annually;
(4) cooperate with agencies in acquiring and developing four new public access sites to the Missouri River, contributing funds for acquisition, development, operation, and maintenance;
(5) manage public access to the Cochrane, Ryan, and Morony reservoirs by initiating closures for safety with respect to rapid changes in reservoir levels and by enhancing access for bicyclists and pedestrians;
(6) contribute funds for the reconstruction of the Carter Ferry Access Site;

(7) development of the Black Eagle Recreation Area below the Black Eagle Dam, providing funding for development, operation, and maintenance;
(8) contribute funding toward the completion of the Lewis and Clark Overlook and the construction of a new overlook at Crooked Falls near Rainbow Dam, and provide funds for operation and maintenance;
(9) provide for public access across Cochrane Dam;
(10) construct a pedestrian/bicycle trail from Rainbow Dam to the proposed Sulfur Springs Trailhead, contributing funds for development, operation, and maintenance, and;
(11) construct a trailhead for the USFS's Sulphur Spring Trail downstream of Morony Dam, contributing funds for development, operation, and maintenance.

For aesthetic resources at the Black Eagle, Rainbow, and Ryan dams, Montana Power proposes to spill a minimum of 200 cfs between 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day weekend and ending with the Labor Day weekend, except when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet.

Hebgen Development

Montana Power does not propose any physical modifications to the existing Hebgen facilities, but plans to modify project operations. Rather than conduct the annual 11-foot drawdown of the reservoir from September through November, Montana Power proposes to conduct drawdown from September through March. The proposed drawdown schedule would provide for more constant outflows in the fall and winter months and would increase the dependable winter capacity for power generation at Madison Dam, which is located 63 miles downstream from Hebgen Dam.

Under typical operating conditions (i.e., when river flow is not extremely high or low), Montana Power proposes to: (1) maintain a continuous minimum flow of 150 cfs in the Madison River as measured just downstream from the dam; (2) endeavor to limit flows near Kirby Ranch to no more than 3,500 cfs to minimize erosion of the Quake Lake outlet; (3) endeavor to limit changes in outflow from the dam to no more than 10% per day between August 1 and March 31; (4) endeavor to maintain the elevation of the reservoir between 6,530.3 and 6,534.9 feet (normal full pool elevation) from June 20 through October 1; (5) after April 1, endeavor to refill to full pool elevation by late June or early July; and (6) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

Under special circumstances, Montana Power would deviate from normal operations without concurrence from resource agencies to: (1) accommodate special maintenance or construction requirements; (2) allow for archaeological studies; and (3) satisfy power production purposes during an extended period of extreme drought. The Missouri River Coordination Agreement with BUREC requires that water stored in Hebgen Reservoir (and in the reservoirs at the eight other Missouri-Madison Project Developments) be used to enhance downstream power production if extreme drought conditions persist for an extended period. The circumstances under which Montana Power would deviate from normal operations without agency concurrence apply for all of the Missouri-Madison Project Developments.

Montana Power has conducted studies concerning the addition of generating facilities to the Hebgen Development, including a powerhouse and a transmission line 14 to 27 miles long. However, this

alternative was found to be uneconomical. Montana Power has also considered operational alternatives, including the current drawdown schedule and the proposed drawdown schedule.

Montana Power would implement several mitigation and enhancement measures specifically for the Hebgen development. For water quality, Montana Power proposes to place sampling stations above and below Hebgen Reservoir. Montana Power would also assist the MDHES and the Gallatin County Health Department in monitoring toxic algae in Hebgen Reservoir. The applicant would also establish a permanent flow gauge station on the Madison River at Kirby, Montana.

For wildlife, Montana Power proposes to conduct a study to determine the growth and distribution of submerged macrophytes and their use by waterfowl in the Hebgen Reservoir.

After issuance of a new license, Montana Power would, in consultation with the Montana State Historic Preservation Office (SHPO) and the USFS, conduct archaeological surveys to recover data and resources from specific prehistoric archaeological properties near the Hebgen Development. Within two years after the issuance of a new license, Montana Power would (1) generate a list of National Register-eligible prehistoric cultural properties for inclusion in data recovery, and (2) develop a specific scope of work for each property selected for inclusion in data recovery. Montana Power would consult with the Wind River Shoshone regarding treatment of effects on traditional cultural properties.

For recreational resources at the Hebgen Development, Montana Power proposes to: (1) develop a day-use area at Hebgen Dam within four years of the issuance of a new license; (2) develop an RV dump station in conjunction with an existing commercial operator along the north shore of Hebgen Reservoir within four years of the issuance of a new license; (3) enhance public access to Hebgen Reservoir by developing two fishing sites accessible to individuals with disabilities and having trails, fishing platforms, rest rooms, and signs; (4) cooperate with the USFS to enhance public access to the Madison River by improving the Lyon's Bridge access site, and; (5) monitor and mitigate damages to Hebgen Reservoir boat ramps and docks that might be caused by the proposed change in management of reservoir water levels.

Madison Development

Montana Power does not propose any new facility construction or expansion at the Madison Development. However, Montana Power does propose to upgrade the existing powerhouse, spillway, and tailrace and to replace existing equipment in the powerhouse. The powerhouse would be upgraded with four vertical shaft turbine-generator units having a combined rating of 12,400 kW using 1,650 cfs at 101 feet of head. These upgrades would increase the Madison Development's generating capacity to 12.4 MW.

Montana Power proposes to maintain the reservoir level at a 1-foot drawdown for most of the winter, and to reduce the water level by another foot just before ice breakup to avoid shoreline erosion by ice. The current practice is to keep the reservoir in a 2-foot drawdown for the entire winter season. The proposed drawdown practice is also intended to benefit fisheries.

Under typical operating conditions, Montana Power proposes to: (1) operate the Madison Dam as a baseload, run-of-river project (i.e., the dam would not be used for peaking, load following, or providing nonspinning operating reserves); and (2) endeavor to maintain the elevation of Madison

Reservoir between 4,840 and 4,841 feet (normal full pool) when ice is absent, at 4,840 feet when an ice cover is present, and at 4,839 feet during ice breakup.

Principal alternatives considered by Montana Power for the Madison Development include: (1) retire and/or remove the power production equipment and facilities; (2) remove the dam and the generation facilities; and (3) rehabilitation of existing facilities. Montana Power also considered operational alternatives, including the current drawdown schedule, the proposed drawdown schedule, and no winter drawdown.

Montana Power proposes several mitigation and enhancement measures specifically for the Madison Development. For water quality, Montana Power proposes to establish sampling stations at the MDFWP river access above Ennis and directly below the Madison powerhouse. Montana Power also proposes to install a mechanical intake screen rake system at Madison Dam to remove floating macrophytes, thus eliminating the need for periodic deep (greater than 2 feet) reservoir drawdowns to control the growth of macrophytes in shallow portions of the reservoir.

For fisheries, Montana Power would: (1) provide annual funding for the recovery of threatened and endangered fish species, emphasizing the Arctic grayling; (2) provide, to the MDFWP, funding for an investigation of pre- and post-spawning movements of Arctic grayling below Madison Dam to determine the need for a fish ladder; (3) provide funding to mitigate fisheries losses, as determined by research studies, associated with warming of the Lower Madison River possibly caused by the operation of Madison development, and; (4) fund appropriate measures to mitigate fisheries losses associated with reduction in Madison River flow between Madison Dam and the Madison powerhouse.

Montana Power has developed an agreement with BLM for managing the Madison Development's recreational resources. Montana Power would: (1) develop a public day-use site on the north shore near the reservoir's outlet within one year of completion of the development's powerhouse rehabilitation; (2) enhance public access to the reservoir by developing a campground on BLM's West Shore property within one year of the issuance of the new license; (3) install interpretive facilities at the Fall Creek Access Site; (4) enhance public access on the river by developing an access site to be operated by BLM on BLM land on the east side of the river just upstream from the Black's Ford Fishing Access Site within four years of issuance of the new license; (5) cooperate with the MDFWP to improve the Grey Cliff Fishing Access Site within two years of issuance of the new license, and; (6) identify and mark a portage route around the right side of the dam within one year of issuance of the new license.

Hauser Development

Montana Power does not propose any new facility construction or expansion at the Hauser Development. However, Montana Power does propose to overhaul and replace existing equipment in the powerhouse and to modify the slide gates in the spillway to provide flow restoration in the event of a trip of all plant units. These upgrades would increase the Hauser Development's generating capacity to 21 MW. In addition, Montana Power proposes to remove transmission lines associated with the Hauser Dam from FERC licensing reviews.

Under typical operating conditions, Montana Power proposes to: (1) operate the Hauser Dam as a baseload, run-of-river project (i.e., the dam would not be used for peaking, load following, or

providing nonspinning operating reserves); (2) endeavor to maintain the elevation of Hauser Reservoir and Lake Helena between 3,634.4 and 3,635.4 feet (normal full pool); (3) endeavor to limit to 10% the difference between the daily average flow measured just below Hauser Dam and the daily average inflow to Hauser Reservoir and Lake Helena; (4) endeavor to limit the differences in flows from day to day (which are influenced by upstream releases from BUREC's Canyon Ferry Dam) and from hour to hour (proposed maximum of 5% difference from hour to hour); and (5) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

Principal alternatives considered by Montana Power for the Hauser Development include: (1) construction of a new powerhouse; (2) improvement or replacement of various equipment; and (3) increasing the generating capacity by the construction of additional facilities and using additional water volume. Montana Power also considered operational alternatives, including: (1) the run-of-river mode; (2) a peaking mode, and; (3) holding Hauser Reservoir and Lake Helena below normal full pool elevation during the winter to reduce shoreline erosion caused by ice. The alternatives of project expansion and peaking were dropped primarily because of potential impacts on fish populations, and the winter drawdown was dropped because of greatly reduced generating capacity and potential impacts on fish and bald eagles.

Montana Power proposes several mitigation and enhancement measures specifically for the Hauser Development. For water quality, Montana Power proposes to establish water quality sampling stations below the outlet of Canyon Ferry Dam and below Hauser Dam. Also, Montana Power would fund the establishment of a permanent flow gauge in the Missouri River below Hauser Dam, providing funds for development and operation.

For fisheries, Montana Power would monitor total gas tensions and gas bubble trauma in trout in the river downstream from Hauser Dam during rehabilitation of the powerhouse, and provide funding for any mitigation measures determined by the study to be needed.

For recreational resources at the Hauser Development, Montana Power would: (1) improve and expand its Hauser Dam Public Access Site within five years after issuance of the new license; (2) contribute, in cooperation with BLM, funding for the planning and development of the Devil's Elbow Public Use Area, which would be operated by BLM, and; (3) acquire and develop White Sandy Beach as a day-use and camping area and expand the MDFWP's proposed fishing piers at the Causeway within three years of issuance of the new license.

Holter Development

Montana Power does not propose any new facility construction or expansion at the Holter Development. However, Montana Power does propose to modify the slide gates on the spillway to provide flow restoration in the event of a trip of all plant units and to install new controls and an emergency generator.

Under typical operating conditions, Montana Power proposes to: (1) operate the Holter Dam as a baseload, run-of-river project (i.e., the dam would not be used for peaking, load following, or providing nonspinning operating reserves); (2) endeavor to maintain the elevation of Holter Reservoir between 3,563 and 3,564 feet (normal full pool); (3) endeavor to limit to 10% the difference between the daily average flow measured just below Holter Dam and the daily average inflow to Holter

Reservoir; (4) endeavor to limit the differences in flows from day to day (which are influenced by upstream releases from BUREC's Canyon Ferry Dam) and from hour to hour (proposed maximum of 5% difference from hour to hour); and (5) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

In addition to the deviations from normal operations described under the Hebgen Development, Montana Power may temporarily (for a period of a few to several days) increase flows from the Holter Development during and immediately preceding periods of extreme cold to maintain or enhance power production at the Project Developments downstream.

The principal alternatives considered by Montana Power for the Holter Development are to (1) increase the generating capacity and operate in a peaking or load-shaping mode and (2) hold Holter Reservoir below full pool in the winter to reduce shoreline erosion by ice. The first alternative was dropped because of potential impacts on the fishery, and the second was dropped because of loss of power generation and potential impacts on fish.

Montana Power proposes several mitigation and enhancement measures for the Holter Development; most of the measures would be implemented in conjunction with those discussed earlier for the Hauser Development.

Black Eagle Development

Montana Power does not propose any new facility construction or expansion at the Black Eagle Development.

Under typical operating conditions, Montana Power proposes to: (1) primarily operate the Black Eagle Dam as a baseload, run-of-river project (i.e., the dam would not be used for peaking, load following, or providing nonspinning operating reserves); (2) endeavor to maintain the elevation of Black Eagle Reservoir near its normal full pool elevation of 3,290 feet; (3) spill a minimum of 200 cfs at Black Eagle Dam between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day weekend and ending with the Labor Day weekend [except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet (50% of the 1961-1990 average)]; and (4) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

In addition to the deviations from normal operations described under the Hebgen Development, Montana Power may increase generation above the normal run-of-river level for up to four hours to provide short-term generation reserves.

Montana Power considered expanding the Black Eagle Development's generating capacity, including adding a powerhouse, but decided that this alternative was uneconomical. An alternative (peaking) mode of operation was considered but found to be impractical.

Site-specific mitigation and enhancement proposals for the Great Falls Developments are discussed earlier in this section.

Rainbow Development

Montana Power proposes to raze the existing powerhouse and construct a new powerhouse (160 feet long and 80 feet wide) and a short tailrace about 200 feet downstream from the existing powerhouse. The new powerhouse would contain two generating units with a total rating of 58 MW. Flow lines from the existing surge chamber to the new powerhouse would be constructed, and Montana Power would make improvements to the existing intakes, flow lines, and surge chamber.

Under typical operating conditions, Montana Power proposes to: (1) primarily operate the Rainbow Dam as a baseload, run-of-river project (i.e., the dam would not be used for peaking, load following, or providing nonspinning operating reserves); (2) endeavor to maintain the elevation of Rainbow Reservoir near its normal full pool elevation of 3,224 feet; (3) spill a minimum of 200 cfs at Rainbow Dam between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day weekend and ending with the Labor Day weekend [except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet (50% of the 1961-1990 average)]; and (4) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

In addition to the deviations from normal operations described under the Hebgen Development, Montana Power may increase generation above the normal run-of-river level for up to four hours to provide short-term generation reserves.

Alternatives considered by Montana Power for the Rainbow Development include: (1) retire the powerhouse and generators; (2) continue operating without new equipment, and; (3) three alternative upgrades of equipment providing 38 MW at 5,400 cfs, 58 MW at 8,000 cfs, or 71 MW at 10,000 cfs. The 58 MW alternative was selected based on economic considerations. Montana Power has determined that Rainbow Reservoir does not have sufficient storage to support peaking operations.

Site-specific mitigation and enhancement proposals for the Great Falls Developments are discussed earlier in this section. In addition, Montana Power would provide annual funding to mitigate fisheries losses caused by dewatering 0.5 mile of the Missouri River below the Rainbow Dam.

Cochrane Development

Montana Power does not propose any new facility construction or expansion at the Cochrane Development. However, Montana Power proposes to increase the normal maximum reservoir water level from 3,115 feet to 3,120 feet, which would increase the reservoir area from 249 acres to 312 acres. This increase in water level, which would increase generating capacity to 60 MW, can not be accomplished until the Rainbow Development has been modified as proposed.

Under typical operating conditions, Montana Power proposes to: (1) operate, at its discretion, the Cochrane Development to provide baseload generation, short-term generation reserves, load-following generation, and, on a coordinated basis with the Ryan and Morony developments, peaking generation; (2) endeavor to maintain, during baseload operation, the elevation of Cochrane Reservoir near its normal full pool elevation (currently 3,115 and proposed 3,120); (3) endeavor to maintain, during operations other than baseload, the elevation of Cochrane Reservoir between 3,105 and 3,115 feet until the Rainbow Development has been modified, and between 3,110 and 3,120 feet

thereafter; and (4) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

Montana Power did not evaluate alternative facilities at the Cochrane Development because the existing generating facilities utilize the river flow essentially to the extent feasible. Montana Power did consider run-of-river operation, but selected peaking operation because of greater economic benefits and because fish and wildlife agencies and Montana Power agreed to consider peaking in exchange for baseload flows from the Morony Development. Montana Power also considered run-of-river mode for Cochrane, Ryan, and Morony dams during summer months to allow greater recreational access to Cochrane and Morony reservoirs, but dropped this alternative because of significant loss in summer generating capacity and limited recreation potential at the reservoirs.

Site-specific mitigation and enhancement proposals for the Great Falls Developments are discussed earlier in this section. In addition, Montana Power would provide annual funding to mitigate fisheries losses caused by reservoir fluctuations.

Ryan Development

Montana Power proposes modifications that would allow the addition of a seventh generating unit, which would increase total capacity to 97 MW. These modifications would include construction of a new intake in the left abutment of the dam, a new penstock through existing dam structures and adjacent to existing buried penstocks, a new, semi-outdoor powerhouse to the left of the existing powerhouse, and making improvements to the existing tailrace channel. The new powerhouse would be located 125 feet downstream of the existing powerhouse, would be 80 feet long and 50 feet wide, and would contain one generator and associated equipment. A short new tailrace would lead to the existing tailrace. Lake levels would remain the same as they are under current operations. Montana Power also proposes to remove one of two adjacent power lines and reconstruct the other.

Under typical operating conditions, Montana Power proposes to: (1) operate, at its discretion, the Ryan Development to provide baseload generation, short-term generation reserves, load-following generation, and, on a coordinated basis with the Cochrane and Morony developments, peaking generation; (2) endeavor to maintain, during baseload and other operations, the elevation of Ryan Reservoir near its normal full pool elevation of 3,037 feet by coordinating operations with the Cochrane Development; (3) spill a minimum of 200 cfs at Ryan Dam between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer, beginning with the Memorial Day weekend and ending with the Labor Day weekend [except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet (50% of the 1961-1990 average)]; and (4) obtain concurrence from the appropriate resource agencies to intentionally deviate from the above proposed operations during normal river flows and normal facility conditions.

For the Ryan Development, Montana Power considered various peaking operations, run-of-river operation (which is the current normal operation), and a second powerhouse (to serve in addition to the existing powerhouse) with three alternate capacities: 22 MW at 2,000 cfs, 32.5 MW at 3,000 cfs, and 40 MW at 3,700 cfs (proposed). The selection of the 40 MW addition was based on the greatest economic benefit. Peaking was selected because of greater economic benefit and because fish and wildlife agencies and Montana Power agreed to consider peaking in exchange for baseload flows from the Morony Development. Montana Power also considered run-of-river mode for Cochrane, Ryan, and Morony dams during summer months to allow greater recreational access to

Cochrane and Morony reservoirs, but dropped this alternative because of significant loss in summer generating capacity and limited recreation potential at the reservoirs.

Site-specific mitigation and enhancement proposals for the Great Falls Developments are discussed earlier in this section.

Morony Development

Montana Power does not propose any new facility construction or expansion at the Morony Development. However, Montana Power would modify two of the nine radial gates on the dam's spillway to provide for flow restoration in the event of loss of bus potential at the plant.

Montana Power proposes to operate the Morony Development as a baseload project with outflows approximately equal to the inflow into the Great Falls developments upstream. The Morony Development would not be used for peaking, load following, or providing nonspinning operating reserves. The Morony Development would be used to re-regulate releases from the Cochrane and Ryan developments when they are operated to provide short-term reserve generation, load-following generation, or peaking generation. This is a slight operational change for the Morony Development, which currently operates in a run-of-river mode.

Under typical operating conditions, Montana Power proposes to: (1) endeavor to maintain, during baseload operations at the Ryan and Cochrane developments, the elevation of Morony Reservoir between 2,885 and 2,888 feet; (2) endeavor to maintain, during Ryan and Cochrane operations other than baseload, the elevation of Morony Reservoir between 2,878 and 2,888 feet; (3) endeavor to limit to 10% the difference between the daily average flow measured just below Morony Dam and the daily average inflow to the Great Falls developments; (4) endeavor to limit the differences in flows from day to day (which are influenced by upstream releases from BUREC's Canyon Ferry Dam) and from hour to hour (proposed maximum of 7.5% difference from hour to hour); and (5) obtain concurrence from the appropriate resource agencies to intentionally deviate from proposed operations during normal river flows and normal facility conditions.

Montana Power did not evaluate alternative facilities at the Morony Development because the existing generating facilities utilize the river flow essentially to the extent feasible. Montana Power considered run-of-river and peaking alternatives but, in agreement with fish and wildlife agencies, selected the proposed operation to re-regulate flows from Cochrane and Ryan reservoirs to provide a baseload flow from Morony Dam. The applicant also considered run-of-river mode for Cochrane, Ryan, and Morony dams during summer months to allow greater recreational access to Cochrane and Morony reservoirs, but dropped this alternative because of significant loss in summer generating capacity and limited recreation potential at the reservoirs.

Site-specific mitigation and enhancement proposals for the Great Falls Developments are discussed earlier in this section. In addition, Montana Power would provide annual funding to mitigate fisheries losses caused by reservoir fluctuations and to support studies and recovery activities for threatened and endangered species (emphasizing the pallid sturgeon) between Morony Dam and the Fort Peck Reservoir. Montana Power would also provide funding for a study to determine the river flows needed to maintain and enhance riparian vegetation from Morony Dam to the Fort Peck Reservoir.

3.2 ALTERNATIVE OPERATION AND ENHANCEMENT

Several agencies, tribes, and interested parties involved in the relicensing effort have suggested alternative measures, which would provide different levels of enhancement and protection of natural resources than those proposed by Montana Power. These additional measures could change the way the project is operated in terms of instream flow releases and reservoir operations. Many suggested enhancement measures address alternative ways to enhance project recreation resources, fishery resources, and wildlife resources. Staff will analyze these alternative measures in the EIS and make suggestions to the Commission based on their findings. Specifically, staff will analyze the following alternative operations measures:

- Alternative winter drawdown schedules for the Hebgen, Madison, Hauser, and Holter developments.

- Alternative minimum flows for the Hebgen and Madison developments.

- Alternative maximum flows for the Hebgen and Madison developments.

- Alternative ramping rates for the Hebgen, Hauser, Holter, and Morony developments.

- Alternative scenarios for the Madison Development, including pulsed flow operations, dam removal, raising the dam, and channelling around the dam.

Staff will examine alternative instream flows and reservoir levels and recommend flows and levels that provide the best comprehensive plan, ensuring adequate protection of aquatic resources in relation to needs for power (developmental resources). Additionally, staff will analyze the appropriateness of providing flows and levels necessary to accommodate recreational activities in stream reaches between developments and on project reservoirs. Staff will also examine the proposed ramping of project flow releases to determine how the proposed ramping program relates to current agency recommendations and to the protection of instream resources.

Staff will examine alternative wildlife plans and analyze their individual components to determine the relative benefits and significance of each plan to important resource areas. In particular, effects on wetlands, wildlife, and threatened and endangered species will be examined.

Staff will analyze Montana Power's recreation proposal based on area needs and relative supply and abundance of alternative resources. Staff will also examine the recreation plan with respect to wildlife and fishery enhancement measures. Alternative areas for recreation access and the need for recreational improvements at project reservoirs and in stream reaches between developments will also be addressed.

3.3 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, with no change in existing environmental conditions. Because no participant advocates continuing the status quo, staff uses this alternative to establish baseline environmental conditions for comparison with other alternatives. The alternative of license denial and project decommissioning is discussed below in Section 3.4

3.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Staff considered several other alternatives to Montana Power's relicensing proposal but eliminated them from detailed study because they are not reasonable in the circumstances of this case. They are:

(1) Federal takeover and operation of the project;

(2) Issuing a nonpower license; and

(3) Decommissioning the project.

Staff does not consider Federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that Federal takeover should be recommended to Congress. No party has suggested that Federal takeover would be appropriate, and no Federal agency has expressed an interest in operating the project.

Issuing a nonpower license would not provide a long-term resolution of the issues presented. A nonpower license is a temporary license which the Commission will terminate whenever it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered in the nonpower license. In this case, no agency has suggested its willingness or ability to do so. No party has sought a nonpower license, and staff has no basis for concluding that the project should no longer be used to produce power. Thus, a nonpower license is not a realistic alternative to relicensing in these circumstances.

Project decommissioning could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions. Although removal of the Madison Dam has been suggested as an alternative mode of project operation (see Section 3.2), no participant has suggested that removing all nine project dams would be appropriate in this case. Therefore, staff has no basis for recommending project decommissioning through the removal of all nine dams. Removing the dams is considered unreasonable because they are important for flood control, fish and wildlife resources, and recreation. Thus, removal of the nine dams is not a reasonable alternative to relicensing the project with appropriate mitigation and enhancement measures.

The second decommissioning alternative would involve retaining the dams and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require staff to identify another government agency willing and able to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor does staff have any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, staff does not consider removal of the electric generating equipment to be a reasonable alternative.

SECTION 4.0
ENVIRONMENTAL ISSUES

A preliminary list of environmental issues to be addressed in the EIS is provided below. This list identifies general issues raised through the application process that appear to be potentially significant. At this point in the process, the staff has not identified any resource issues that are of lesser importance and do not require a detailed analysis in the DEIS. Upon completion of the scoping sessions, the issues will be reviewed and a determination will be made as to the level of analysis needed. If preliminary analysis indicates particular issues raised have little potential for causing significant impacts, detailed analysis will not be made in the EIS and justification will be provided in SD-II.

The following items represent potentially significant resource issues that would be examined in the EIS.

4.1 CUMULATIVE IMPACTS

The Commission recognizes the importance of analyzing both the site-specific and cumulative impacts of hydropower development in order to make sound licensing decisions. The potential for a project's impacts to interact with those of other river basin developments will be addressed in the cumulative impacts section of the EIS.

Cumulative impacts are the additive or interactive impacts on resources caused by multiple developments within a river basin. Individually small or other seemingly minor impacts of actions performed by several agencies or persons, when added together in space and time, may result in combined impacts that have serious environmental consequences.

The EIS will identify and describe the status of resources that are most likely to be affected in a cumulative manner by the relicensing of the Missouri-Madison Hydroelectric Project. The effects of past and present activities, as reflected in the existing environment, may provide a context for determining the potential for cumulative impacts.

The EIS will describe the overall impact of the project under review and of other developmental activity in conjunction with the impact of other proposed and existing developments on the resources identified. The project may not significantly impact the status of these resources or the project may contribute to beneficial or adverse cumulative impacts.

We invite your input on what resources should be included in the cumulative impact section of the EIS, and on whether the geographic area selected for the analysis is appropriate. The resources we have preliminarily identified in the Madison and Missouri basins are presented below.

- Water quality: proposed alternative water levels and flow releases could contribute to cumulative impacts related to turbidity and suspended sediments, water temperatures, and arsenic deposition

- Fisheries resources: proposed alternative water levels and flow releases could contribute to cumulative impacts on fish habitat

- Vegetation resources: proposed alternative water levels and flow releases could contribute to cumulative impacts on aquatic and riparian vegetation and habitats, including wetlands, above and below project dams

- Wildlife resources: proposed alternative water levels and flow releases could contribute to cumulative impacts on habitat for waterfowl and raptors

- Recreational resources: proposed alternative water levels and flow releases could contribute to cumulative impacts on fish habitat and fishing opportunities and on existing water-based recreation facilities

4.2 GEOLOGY AND SOILS

- Proposed flows, reservoir levels, and reservoir releases in the Madison-Missouri River system may cause site-specific impacts on soils by decreasing or increasing reservoir shoreline slope stability and erosion and streambank erosion.

- The Madison River basin has a history of seismic activity. Uniform Building Code seismic hazard curves could be used to provide a conservative estimate of the probability of exceeding the existing dams' design base earthquake ground motions.

4.3 WATER QUANTITY AND QUALITY

- Proposed continuous instream flows of 1,100 cfs below Madison Dam would reduce stream flow variability when Madison Dam is not spilling. This could have secondary effects on turbidity and suspended sediments by altering erosion and sedimentation processes in the affected reaches.

- Proposed flow ramping rates from above Hauser Dam to 90 miles below Holter Dam, and for the Missouri River below Morony Dam, would reduce hourly and daily flow fluctuations. This could have secondary effects on turbidity and suspended sediments by altering erosion and sediment transport processes in the affected reaches.

- Stream water temperatures are affected by the timing and volume of releases from Hebgen, Madison, Hauser, and Holter reservoirs. Montana Power is continuing modeling studies of the effects of Hebgen Dam and Madison Dam releases on stream temperatures in the Madison River.

- Hebgen Reservoir water has high levels of total and dissolved arsenic. Stream bottom sediments downstream also contain arsenic which could be mobilized due to proposed operational changes, increasing concentrations in the stream water. The potential risks of adverse effects on water quality due to arsenic have not been quantified.

- Rainbow Reservoir bottom sediments contain high concentrations of arsenic. Proposed operational changes could mobilize this arsenic, increasing its concentration in the water column within and below the reservoir. The risk of adverse effects on water quality due to arsenic have not been quantified.

- Supersaturation of entrained gases has been documented below Hauser Dam, and also may be occurring below Madison Dam. Proposed operational changes at these dams could affect the amount, timing, and duration of supersaturation occurrences. The potential effects of these proposed changes should be quantified.

- Both Hauser Reservoir and Holter Reservoir stratify during part of the year, causing lowered dissolved oxygen (DO) concentrations in their deeper waters. Proposed minimum pool elevations could intensify stratification, further depressing DO in deeper waters. Also, proposed operational changes could potentially increase releases of these DO-depleted waters. These two possibilities could result in larger releases with lower DO than current conditions.

4.4 FISHERIES RESOURCES

- Changes in dam operation to maintain more stable release patterns could cause changes in reservoir pool elevations, with subsequent adverse impacts on reservoir-based fish populations. For example, changes in operation of Madison Dam could adversely affect important spawning and rearing habitat for Arctic grayling and other fish species in the headwaters of Madison Reservoir.

- The stabilization of flows below Hebgen, Madison, Hauser, Holter, and Morony dams could have beneficial effects on tailwater fish populations.

- Habitat enhancement and protection actions in the upper and lower Madison River could have beneficial effects on this very valuable coldwater fishery.

- Continued entrainment/impingement mortality in turbines coupled with increased recreational fishing harvests due to improved access and facilities could reduce existing reservoir and riverine fish populations.

- Mitigation intended to reduce reservoir-induced warming of releases from Madison Dam could have beneficial effects on tailwater fisheries, but depending on the mitigation selected, reservoir fish could be adversely affected.

- Proposed peaking operations at Cochrane and Ryan dams could have adverse effects on reservoir-based fish populations in this portion of the Missouri River. However, this effect may be compensated for by the beneficial effect of stabilized flows below Morony Dam.

- Dewatering of approximately 0.5 mile of the Missouri River below Rainbow Dam could reduce the productivity of the fishery in this tailwater.

- Proposed annual winter drawdowns of the reservoirs above Madison, Hauser, and Holter dams could adversely affect aquatic macrophytes and associated fish habitat in these reservoirs.

4.5 VEGETATION RESOURCES

- Proposed alternative flows, reservoir levels, and reservoir releases may cause cumulative and site-specific impacts on aquatic and riparian vegetation and habitats, including wetlands, above and below project dams.

- Development of proposed recreational enhancements could adversely affect vegetation in natural areas and wildlife habitats.

- The proposed regulation of Hebgen Reservoir water levels may increase the abundance of submerged macrophytes, a beneficial effect for waterfowl and eagles.

- The proposed winter drawdown of Madison Reservoir may reduce aquatic habitat that provides forage and prey resources for overwintering trumpeter swans and nesting bald eagles.

- Shoreline erosion caused by ice at Hauser Reservoir and Holter Reservoir may affect vegetation that supports wildlife habitat. No direct impacts have been identified for the Great Falls developments, but reservoir drawdown at the Cochrane, Ryan, and Morony developments could affect shoreline habitat.

4.6 WILDLIFE RESOURCES

- Waterfowl and raptors, which are diverse and abundant near the Hebgen, Madison, Hauser, and Holter reservoirs, could be affected by habitat changes resulting from proposed alternative flows, reservoir levels, and reservoir releases.

- Threatened and endangered species, including bald eagles and peregrine falcons, could be affected by proposed alternative flows, reservoir levels, reservoir releases, and recreation enhancements.

- Bald eagle nesting territories at the Hebgen and Madison reservoirs need to be protected. Protection is also needed for any peregrine falcons that may nest in the area; several sightings of peregrine falcons have been confirmed at Madison Reservoir.

- Proposed continuous flows below Hebgen Dam could have a beneficial effect by increasing the security of island-nesting waterfowl.

- Protection is needed for several bald eagle nests in the vicinity of Hauser Reservoir, for potential peregrine falcon nest sites, and for the eagle wintering population, which has varied from 25 to 50. Peregrine falcons have been introduced to the Hauser area and may begin nesting there in the future. Periodic, short-term drawdowns of Hauser Reservoir may be beneficial to eagles and peregrine falcons. Loss of fish as a result of spill over Hauser Dam, impingement, and entrainment may reduce the reservoir food base for bald eagles.

- Overhead power lines over and near the rivers could create a collision hazard for birds, including a power line at Hauser Dam that is a collision hazard for eagles.

- An active peregrine falcon nest site and several bald eagle nests located on and near Holter Reservoir need protection. Loss of fish as a result of spill over Holter Dam, impingement, and entrainment may reduce the reservoir food base for bald eagles.

- The variety and numbers of wildlife at the Great Falls developments are lower than at the other developments. No existing or potential impacts on wildlife have been identified, but

reservoir drawdown at the Cochrane, Ryan, and Morony developments could reduce fish populations that provide prey for bald eagles, other fish-eating raptors, and waterfowl.

- The Missouri River from Morony Dam to Fort Benton is important to waterfowl and overwintering eagles, and is influenced by releases from Morony Dam. The proposed re-regulation of flows by Morony Dam may benefit downstream fish and wildlife by stabilizing releases.

- Development of proposed recreational enhancements and activities could disturb wildlife.

4.7 CULTURAL RESOURCES

- The project could have adverse effects on archaeological, architectural/engineering, or traditional cultural properties if proposed facility modifications or project operations diminish the integrity of a property's location, design, setting, materials, workmanship, feeling, or association.

- Proposed and alternative reservoir levels could affect prehistoric archaeological sites (primarily lithic scatter and cultural material scatter sites) in reservoir fluctuation zones (FZ) and backshore zones (BZ). Continued and new erosion at project reservoirs could result in data loss in both the FZ and the BZ. Wave action would continue to affect properties in the FZ and FZ/BZ interface, where lands of moderate slope would continue to erode during full-pool periods. During drawdown periods, FZ and FZ/BZ interface areas would continue to be subject to repeated freeze-thaw cycles, which weaken the soil structure and cause bank-line slumping.

- The development of proposed recreational facilities could have adverse affects on archaeological, architectural/engineering, or traditional cultural properties.

- Proposed facility modifications could have adverse affects on the historic architectural and engineering characteristics of project facilities built before 1943. These historic properties may consist of single structures or groups of structures (multiple property listings). Some project facilities are substantial in size and scale, and are essential to the significance and integrity of the project as an historic architectural and engineering property. Historic districts consisting of hydroelectric facilities and associated structures are located at the Hebgen, Madison, Hauser, Holter, Black Eagle, Rainbow, Ryan, and Morony developments.

- Project operation would continue to have adverse affects on traditional cultural properties associated with modern practices of the Wind River Shoshone, the Salish, the Kootenai, and the Blackfeet. Information about spiritual properties may not be shared openly in the consultation process. Therefore, it may be necessary to recommend protective agreements for such information rather than regard certain properties as insignificant. Also, the Tribes' preferred approach to resource protection may differ from archaeologists' preferred approach. The former may prefer that a property be allowed to decay out of respect for its spirituality, while the latter may prefer to conserve or recover the property as a source of information.

4.8 VISUAL RESOURCES

- Proposed modifications at the Madison, Hauser, Rainbow, and Ryan powerhouses would create minor construction-related impacts (dust, noise, additional traffic, etc.).

- USFS is seeking National Scenic River designation for the 2.5-mile segment of the Missouri River below Hauser Dam. Changes in river levels due to proposed project operations could affect the values for which this segment has been nominated.

- USFS has nominated a 16-mile segment of the Missouri River from Upper Holter Reservoir to Lower Holter Reservoir as the Gates of the Mountains National Scenic Waterway. Changes in river levels due to proposed project operations could affect the values for which this segment has been nominated.

- To enhance visual resources, Montana Power proposes to spill a minimum of 200 cfs over the Black Eagle, Rainbow, and Ryan dams and falls between the hours of 9:00 a.m. and 8:00 p.m. on weekends and holidays during the summer (Memorial Day through Labor Day), except during years when the April-June natural runoff into Canyon Ferry Reservoir is less than 900,000 acre-feet.

4.9 RECREATIONAL RESOURCES

- Proposed alternative flows and reservoir levels at the Madison Development could affect water quality and temperature downstream, and thus could have adverse effects on the fishery resource of the Madison River, a "Blue Ribbon" trout stream recognized as one of the finest wild trout streams in the country.

- Montana Power's project-wide and development-specific mitigation and enhancement proposals could have beneficial impacts on recreational resources for the entire Missouri-Madison river system.

- Increased traffic, dust, and noise and temporary restrictions on user access during construction at the Madison, Hauser, Rainbow, and Ryan developments could have adverse impacts on day-use recreation areas. However, Montana Power's mitigation and enhancement proposals could have long-term beneficial effects on public day use areas.

- Proposed alternative flows and reservoir levels associated with project operation could cause damage to shoreline facilities if reservoirs are lowered after ice has formed.

- Fluctuations in daily reservoir levels associated with peaking operations upstream could create safety hazards associated with recreational use of the Cochrane and Morony reservoirs.

- The segment of the Madison River that runs through the Bear Trap Canyon Wilderness Area is considered one of the best areas for white water floating in Montana. Changes in river flows due to proposed project operations could have adverse impacts.

4.10 SOCIOECONOMIC RESOURCES

- The project would continue to have positive economic impacts by generating employment and income for local residents and property tax revenues for Gallatin, Madison, Lewis and Clark, and Cascade counties.

- The project would create new positive economic impacts by generating employment and income due to modifications at the Madison, Hauser, Rainbow, and Ryan developments.

- Proposed alternative flows and reservoir levels at the Madison Development could affect water quality and temperature downstream. This could have adverse impacts on the Madison River trout fishery and subsequent economic impacts on guide services, outfitters, lodging, etc. MDFWP rates the Madison as the most valuable stream in Montana for angler expenditures, with a value approximately twice that of any other waterway.

4.11 LAND USE ISSUES

- The current use of some project and ancillary buildings at the Hebgen Dam by Montana Power has been identified as a land use issue.

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LIST OF RECIPIENTS

Missouri-Madison Hydroelectric Project (FERC Project No. 2188)

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